

Utilizing high throughput phenotyping to evaluate and demonstrate herbicide and adjuvant efficacy

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Abstract

High throughput phenotyping has wide applications to evaluate genetic traits, plant growth and development in different biotic and abiotic stress environments, as well as under different agriculture management strategies. Additionally, understanding product efficacy and identifying the mode of action prior to field testing would improve product pipeline development for agriculture manufacturers and distributors. WinField United is using multispectral imaging in different stress conditions within a controlled environment setting to evaluate product effectiveness. We have evaluated pesticide product efficacy in the presence and absence of adjuvants. Adjuvants are materials added to a pesticide to enhance performance by improving absorption, spreading, sticking, and penetration properties of the pesticide's active ingredient(s). We have measured a statistically significant increase in pesticide efficacy with the addition of an adjuvant in multiple, independent case studies showing the increased plant health benefit. In one study, we observed a 31% decrease in diseased oat plant tissue [when defined as pixels with Normalized Difference Vegetation Index (NDVI) value <0.3] when an adjuvant was added to a commercial fungicide compared to the untreated control and a 23% improvement when compared to the fungicide alone. Multispectral imaging has also allowed us to build interactive, 3-D models that demonstrate product coverage and penetration. Combining quantitative measurements with interactive, illustrative models, we can more effectively communicate product efficacy results to retail owners and growers. Future directions include evaluating biological product efficacy in which more nuanced plant responses are observed in biotic and abiotic stress environments.

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